FIG. 1.

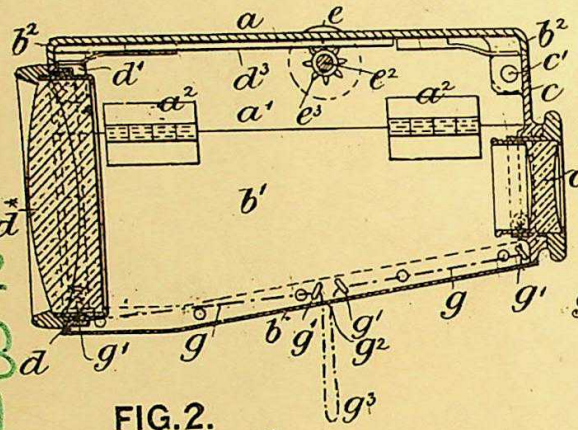

FIG. 3.

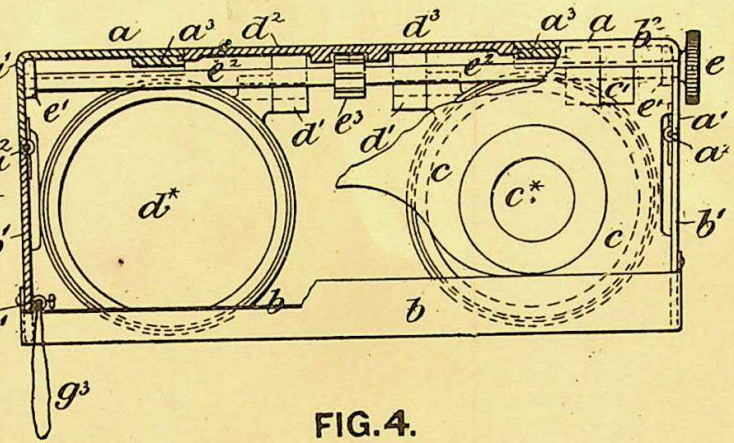

FIG. 6.

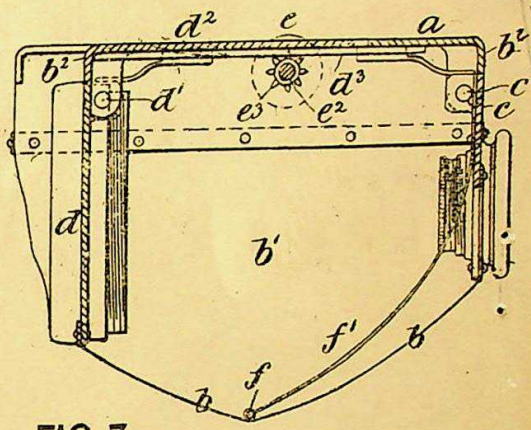

FIG. 2.

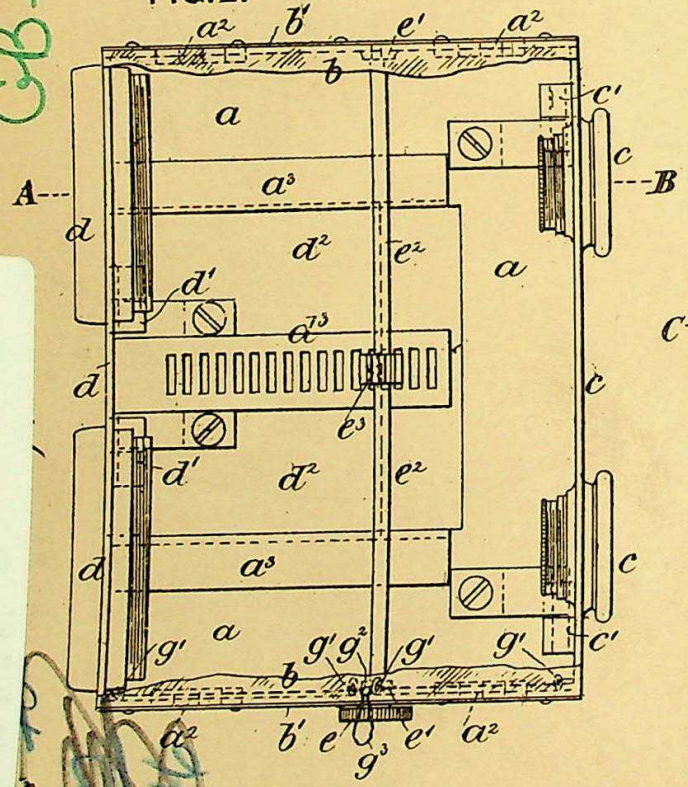

FIG. 4.

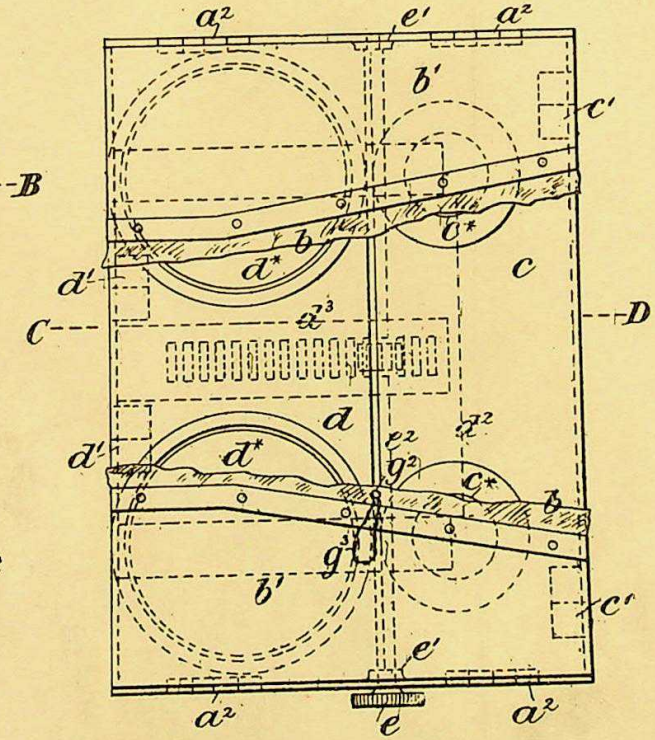

FIG. 7.

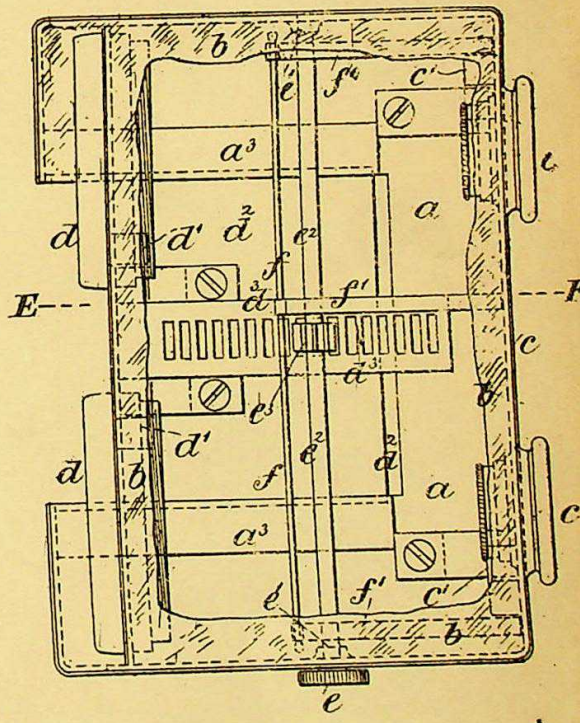

FIG. 5.

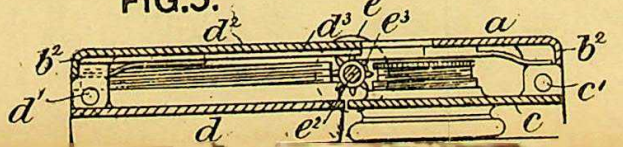

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FIG. 8.

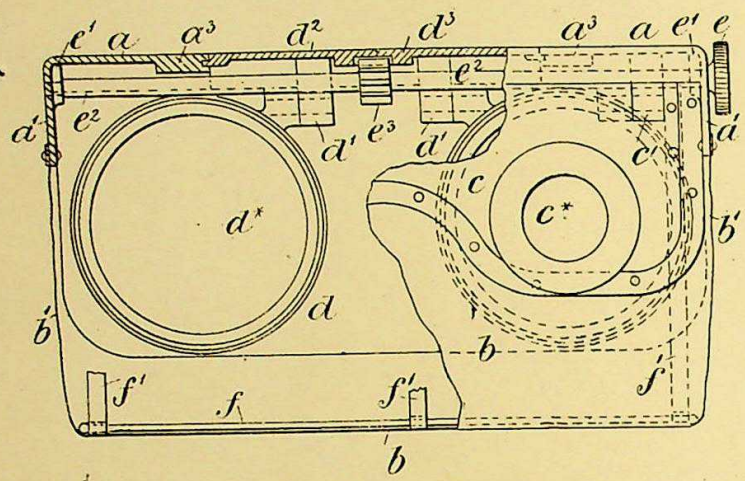


FIG. 10.

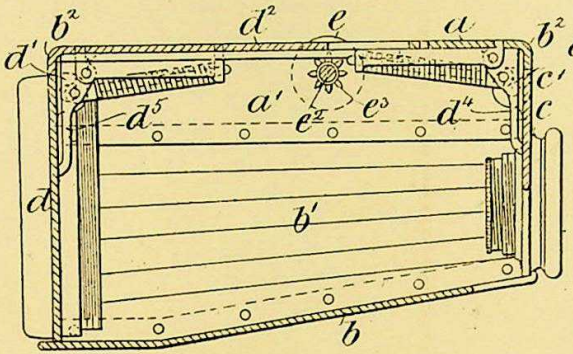


FIG. 11.

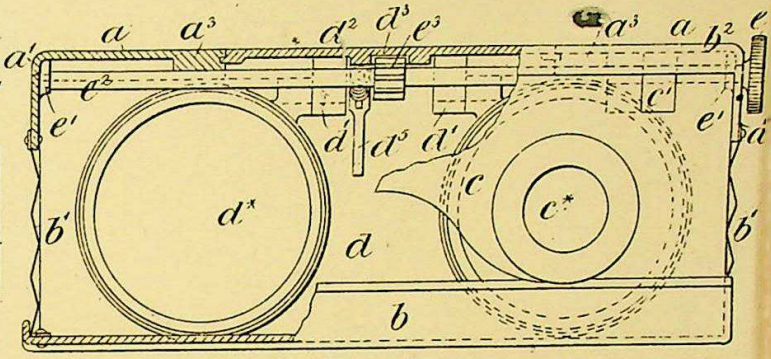


FIG. 9.

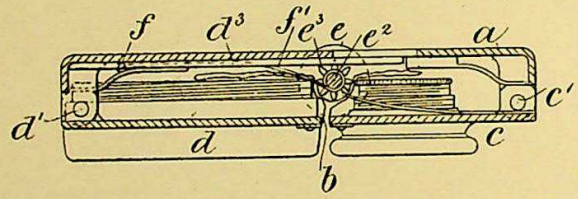


FIG. 12.

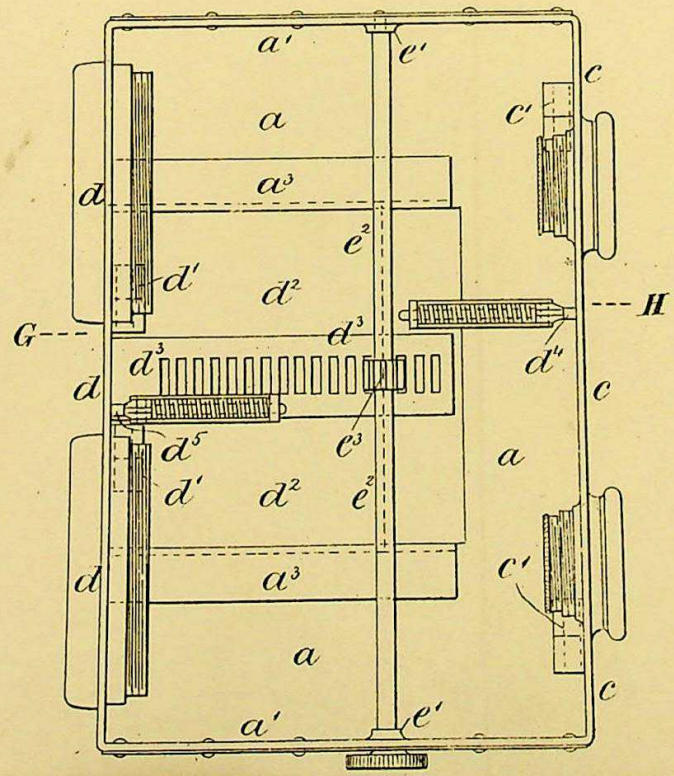
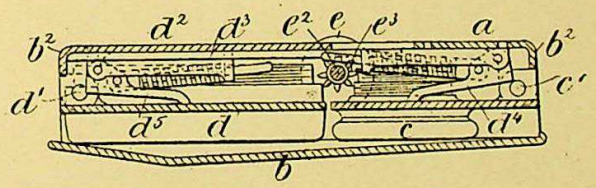


FIG. 13.



Opera Glasses

Date of Application, 12th Dec., 1887
Complete Left, 2nd Feb., 1888
Complete Accepted, 9th Mar., 1888

A.D. 1887, 12*th* DECEMBER. N° 17,107.

PROVISIONAL SPECIFICATION.

Improvements in Opera, Field, and Marine Glasses.

I, WILLIAM ALEXANDER CARDWELL of the Moat Croft, Eastbourne, in the County of Sussex, Lieutenant Colonel of Volunteer Artillery, do hereby declare the nature of this invention to be as follows :—

The object of my invention is to provide an opera, field or marine glass which will be capable of being folded into a small compass when out of use and thus rendered easily portable.

For this purpose I employ a framework of any suitable material which is provided with a rigid top or bottom but the opposite side of which (the top or bottom as the case may be) is formed of flexible material connected to the sides which are hinged to and capable of folding down flat upon the top or bottom.

The ends of the frame are also hinged one to the top or bottom and the other to a slide carried thereby and they are capable of folding in the same manner as the sides.

These ends are formed to carry the lenses and the slide to which one of them is hinged is provided with a rack to which motion is given by means of a pinion whereby one of the ends is capable of being moved nearer to or farther from the other, in order to adjust the instrument, to the required focus.

When in use the sides and ends of the frame are placed in a vertical position and there retained by any suitable means and thus tauten and hold the flexible material in proper form but when out of use the sides and ends may be folded flat upon the top or bottom of the frame when the instrument will assume a compact and convenient form for carrying in the pocket.

Dated this 12th day of December 1887.

WILLIAM ALEXANDER CARDWELL.

By Harris & Mills,
23, Southampton Buildings,
Agents.

[*Price* 8*d.*]

COMPLETE SPECIFICATION.

Improvements in Opera, Field, and Marine Glasses.

I, WILLIAM ALEXANDER CARDWELL of the Moat Croft, Eastbourne, in the County of Sussex, Lieutenant Colonel of Volunteer Artillery, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

The object of my invention is to provide an opera, field or marine glass which will be capable of being folded into a small compass when out of use and thus rendered easily portable.

For this purpose I employ a framework of any suitable material which is provided with a rigid top or bottom but the opposite side of which (the top or bottom as the case may be) is formed of flexible material connected to the sides which are hinged to the top or bottom. Or both the sides and bottom might be flexible or the sides might be flexible and both the top and bottom rigid.

The ends of the frame are also hinged one to the top or bottom and the other to a slide carried thereby and they are capable of folding upon the top or bottom.

These ends are formed to carry the lenses and the slide to which one of them is hinged is provided with a rack to which motion is given by means of a pinion whereby one of the ends is capable of being moved nearer to or farther from the other in order to adjust the instrument to the required focus.

When in use the sides and ends of the frame are placed in a vertical position and there retained by any suitable means and thus tauten and hold the flexible material in proper form but when out of use the sides and ends may be folded upon the top or bottom of the frame when the instrument will assume a compact and convenient form for carrying in the pocket.

And in order that the said invention may be more clearly understood and readily carried into effect I will proceed aided by the accompanying drawings more fully to describe the same.

DESCRIPTION OF THE DRAWINGS.

Figure 1 is a longitudinal section taken on the line A. B of Figure 2 showing an opera or field glass constructed according to my invention and showing the instrument expanded ready for use ; Figure 2 is an underside view thereof with the flexible material broken away. Figure 3 is an end view thereof partly in section. Figure 4 is an underside view showing the instrument when folded and out of use but with the flexible material broken away and Figure 5 is longitudinal section taken on the line C, D of Figure 4.

Figure 6 is a longitudinal section taken on the line E, F of Figure 7 illustrating a modified form of instrument and showing the instrument expanded in readiness for use ; Figure 7 is an underside view thereof with the flexible material broken away.

Figure 8 is an end view thereof partly in section and Figure 9 is a longitudinal section showing the instrument folded and out of use and Figure 10 is a longitudinal section taken on the line G, H, of figure 12 showing a further modification and the instrument expanded. Figure 11 is an end view thereof partly in section ; Figure 12 is an underside view with the bottom removed and Figure 13 is a longitudinal section showing the instrument folded and out of use.

Similar letters of reference indicate corresponding parts in all the figures.

The framework of the instrument according to the arrangement shown at Figures 1 to 5 is constructed with a rigid top a of metal or other suitable material formed with flanges a^1 but with a bottom b of leather, silk or other suitable opaque, flexible material which is rivetted, cemented, or otherwise connected to the sides b^1.

The sides b^1 are also formed of rigid material but they are connected to the flanges a^1 of the top a by hinges a^2 so as to be capable of folding down upon the top a of the instrument.

The rear end c of the frame is hinged to the top a by means of a "sight" hinge or joint c^1 in such manner that it will be firmly held both in its vertical and horizontal positions.

The front end d of the frame is similarly connected by a "sight" hinge d^1 with a slide d^2 which travels between or in guides a^3 formed on or carried by the top a.

These ends c and d are formed to carry the lenses c^* and d^* which are securely held in fittings in the usual manner or they might be cemented in the ends c and d and the slide d^2 to which the end d is hinged is formed or provided with a rack d^3 to which motion is given by means of a pinion e^3 mounted upon a cross shaft e^2 mounted in bearings e^1 carried by the top a and furnished with a milled wheel or button e exterior of one of the side flanges a^1 or there might be a milled wheel e upon each end of the cross shaft e^2, whereby the front end d is capable of being moved nearer to or farther from the rear end c in order to adjust the instrument to the required focus.

A cord g is connected at one end thereof to the end c and at the other end to the end d and passes through eyes or guides g^1 upon the sides b^1 and the bight g^3 thereof is passed out by an aperture g^2 to the exterior of the instrument by which means the ends c and d may by pulling upon the bight g^3 of the cord be brought into a vertical position when the instrument is required for use. Stops b^2 upon the frame prevent the ends being moved beyond their vertical position.

According to this arrangement when the instrument is in use the sides b^1 and ends c, d of the frame are placed in a vertical position as shown at Figures 1, 2 and 3 and the ends are retained in that position by means of the "sight" hinges c^1 and d^1 and the sides b^1 are thus held by the ends c and d ; by these means the flexible material b is tautened and held in proper form for use but when out of use the sides b^1 and ends c, d, may be folded upon the top a of the frame when the instrument will assume the form shown at Figures 4 and 5.

According to the arrangement represented at Figures 6 to 9 I dispense with the rigid sides b^1 and form both the bottom b and sides b^1 of flexible material which I cement, rivet or otherwise securely connect to the flanges a^1 of the top a and also to the ends c and d and in order to retain the bottom b in proper form to prevent any obstruction to the line of sight I employ a bar f carried by springs f^1 connected to the end c and so arranged as to normally exert a downward pressure upon the bottom b and yet be capable of readily folding together with the ends c and d upon the top a. In this arrangement the cord g is not needed as the ends c and d may be readily grasped by the fingers and placed in their vertical position.

In the modification represented at Figures 10, 11, 12 and 13 I form both the top a and bottom b of rigid material, but I form the sides b^1 of flexible material which I securely connect to the top a and bottom b by means of rivets, cement or otherwise. In this example, as in figures 1 to 5 the ends c and d are not connected to the bottom b or to the sides b^1.

In this arrangement I preferably connect the ends c and d with the top a, by means of plain joints or hinges c^1 and d^1 and I employ spring levers d^4, d^5, the one d^4 being carried by the top a and the other d^5 being carried by the slide d^2 to exert a constant

pressure upon the ends *c* and *d* in order to automatically place and retain such ends in a vertical position but so as to allow of such ends being folded down upon the top *a* as shown at Figure 13. The ends will thus, when the instrument is to be used, automatically be brought into a vertical position when they will abut against stops b^2 upon the frame.

A strap or clasp or other fastening means may be employed to retain the instrument in its folded or closed condition.

If desired instead of employing spring levers d^4 and d^5 for opening out the ends *c* and *d*, a cord or cords *g* may be employed for that purpose and the ends may be fitted with sight hinges as described with respect to Figures 1 to 5.

By these means I obtain an opera or field glass which may be folded into a compact form for carrying in the pocket and which may also be readily converted into a practical instrument.

It will be understood that the instrument when out of use may if desired be placed in a suitable case or cover, or when employing a rigid top and bottom, as in figures 10 to 13 a separate case may be found unnecessary.

Although in the drawings I have represented the top of the instrument as being formed to carry the operating parts it will be evident that such arrangement may if desired be reversed and the bottom may be caused to carry such parts.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is :—

1. An opera, field or marine glass constructed in manner substantially as herein shown and described and for the purpose stated.

2. An opera, field or marine glass formed with rigid top or bottom *a*, flexible bottom or top *b*, folding sides b^1, end *c* carrying lenses c^* and hinged to rigid bottom or top *a*, end *d* carrying lenses d^* and hinged to a slide such as d^2 travelling in guides, such as a^3 in top or bottom *a* and provided with a rack d^3 receiving motion from a pinion e^3 and cord *g* for opening out the ends *c* and *d* in manner substantially as herein shown and described and for the purpose stated.

3. An opera, field or marine glass formed with rigid top or bottom *a*, flexible bottom or top and sides *b*, b^1, end *c* carrying lenses c^* and hinged to rigid bottom or top *a*, end *d* carrying lenses d^* and hinged to a slide such as d^2 travelling in guides such as a^3 on top or bottom *a* and provided with a rack d^3 receiving motion from pinion e^3 and springs *f* for supporting or tautening the flexible bottom or top *b* in manner substantially as herein shown and described and for the purpose stated.

4. An opera, field or marine glass formed with rigid top and bottom *a* and *b* flexible sides b^1, end *c* carrying lenses c^* and hinged to rigid top *a* or bottom *b*, end *d* carrying lenses d^* and hinged to a slide such as d^2 travelling in guides such as a^3 on top or bottom *a* or *b* and provided with a rack d^3 receiving motion from pinion e^3 and spring levers d^4, d^5, for opening out and retaining the ends *c*, and *d*, in a vertical position against stops b^2 in manner substantially as herein shown and described and for the purpose stated.

Dated this 2nd day of February 1888.

WILLIAM ALEXANDER CARDWELL.
By Harris & Mills,
23, Southampton Buildings,
Agents.

LONDON: Printed for Her Majesty's Stationery Office.
By DARLING AND SON, LTD.

1888.